REMARKS/ARGUMENTS

Withdrawal of the final rejection, favorable reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Claims 20-27 remain pending.

All of the pending claims are rejected under 35 U.S.C. 103(a) as unpatentably obvious over Quinlan et al for the reasons given in the last office action. In response to Applicants' discussion of Quinlan et al in the last response, the Examiner asserts that the disclosure at column 5, lines 50-58 makes it clear that a mixture of lanthanide cations is contemplated and would include a mixture of cerium and non-variable valency rare earth elements. The argument that doping mixed oxide phase with cerium or praseodymiun results in different effects than would be observed with alkaline earth doping is not convincing since there is no evidence of record to support such contention. It is further asserted that there is no or insufficient evidence of record to support the arguments that addition of even small amounts of cerium into the A-site of lanthanum cobaltate produces an ammonia oxidation catalyst with higher selectivity to nitrogen monoxide than the un-doped catalyst and that the Table on page 7 of the previous response demonstrates that the cerium-doped catalysts give higher efficiency results than the strontium or un-doped lanthanum cobaltate.

Applicants respectfully disagree and request reconsideration and withdrawal of this rejection in view of the following reasons and the accompanying declaration of Dr. Sean Axon, an employee of the assignee of this application and very well qualified in the field of heterogeneous catalysts.

With respect to the disclosure of Quinlan et al (hereafter, sometimes referred to as "US 300") at column 5, lines 51-54, it is disclosed that the "A" cation may be an alkali, alkaline earth, lanthanide, actinide or mixture of these elements. However, there is nothing in this disclosure to suggest to the practitioner to combine a variable valency lanthanide, Ce or Pr, with non-variable valency lanthanides or yttrium (Y).

Thus, the only ternary perovskite oxides with two A-site cations found in US 300 are alkaline earth-doped catalysts of formula $A_{1-x}A'_xBO_3$, where A is any trivalent lanthanide cation, A' is divalent (i.e., 2^+) Ca, Sr or Ba, particularly strontium, x is 0-1 and B is any transition metal having polyvalent (3^+) and (4^+) oxidation states. See column 7, lines 1-6. Only strontium-doped lanthanum cobaltate and strontium-doped lanthanum manganate (see,

Example 5, Table 1) were tested and for these, the selectivity for NO was "only slightly affected by the addition of Sr (2^+)" (column 9, lines 42-44).

Accordingly, the practitioner would not have been motivated to try other "dopants," including Ce, which is known to be difficult to incorporate because of its low solubility.

In this regard, reference is made to the enclosed Declaration of Dr. Axon. For example, in paragraph 7, Dr. Axon states that,

> "it is known that inclusion of cerium and praseodymium in the perovskite structure is difficult whereas inclusion of strontium is relatively straightforward. In this regard, the 'solubility' of strontium in a lanthanum cobaltate perovskite is high. In contrast, it is known that the 'solubility' of cerium in the lanthanum perovskite structure is low and that its inclusion is more difficult. This difference in behavior is discussed in a paper co-authored by myself that published in 2002 (*Chem. Comm.*, 2706, 2002)."

Dr. Axon continues in paragraph 9 to set forth his conclusion that "a skilled person with a knowledge of the low solubility of cerium would not have been motivated by the disclosure of Quinlan to prepare catalysts of the present invention with a reasonable expectation of success" which is the natural conclusion given the fact that addition of strontium 2^+ "only slightly affected" the selectivity for NO.

Given the only slight affect of strontium the practitioner would not have been motivated to attempt to incorporate the more difficulty soluble Ce or Pr cations.

Still further, strontium, on the one hand, and cerium and praseodymium, on the other, differ from each other with respect to valency, divalent for Sr, versus tetravalent for Ce and Pr. Accordingly, the former, but not the latter, substitute the A-cation (e.g., lanthanum cation) to create an oxygen vacancy in the perovskite structure. The latter are believed to either lead to the formation of a vacancy on the lanthanum or praseodymium cation-site, a reduction in the oxidation state of the cobalt or the filling of the oxygen lattice vacancies which exist in the $LaCoO_3$ structure.

Referring again to paragraph 7 of Dr. Axon's Declaration, the declarant explains that,

> "inclusion of a variable-valency cation selected from cerium and praseodymium in the A-site of the cobalt perovskite catalyst leads to improved catalytic performance because of their ability to 'shuttle' between the +4 and +3 oxidation states. Divalent strontium does not have this ability."

Indeed, the evidence of record demonstrates the improved catalytic performance according to the present invention. Such evidence is further documented in the experiment described in paragraph 5 of Dr. Axon's Declaration.

The experiment followed the procedure from Example 2 of the present application for the catalysts $La_{0.98}Sr_{0.02}CoO_3$ and $La_{0.98}Ce_{0.02}CoO_3$. Both catalysts were used under the same conditions for the oxidation of ammonia as described in paragraph 5 and the results are shown in the table on page 3 of the Declaration.

The data is explained in paragraph 6:

> "It is my belief that the higher efficiency figures for the first, second and average values for the Ce-doped $LaCeCoO_3$ catalyst compared to the Sr-doped $LaSrCoO_3$ catalyst are not suggested by and would not have been obvious from the disclosure of Quinlan. In particular, Quinlan does not suggest that different catalytic behavior might arise by including variable valence elements cerium and praseodymium in the perovskite structure. The increase in efficiency demonstrated is significant, for example, in terms of nitric oxide production due to the scale of industrial operations."

The above results and conclusions are commensurate in scope with the breadth of the pending claims. For example, in view of their similar redox properties the practitioner would understand that results similar to those obtained for cerium would be expected for praseodymium. See, e.g., paragraph 8 of Dr. Axon's Declaration.

Similarly, the selection for the Vn element may be based on A-site cations suitable in perovskite lattice where Co is the B-site cation. Thus, those skilled in the art would understand that the choice of the A- and B-site cations would be influenced by the relative cation size and, as such, that Vn would include both non-variable valency rare earths and yttrium.

In particular, with reference to paragraph 10 of Dr. Axon's Declaration, it is explained that, "it is known that these elements [yttrium and the non-variable valency rare earth elements] may all provide suitable A-site elements in a perovskite structure … ."

Accordingly, it is respectfully submitted that for at least the reasons set forth above, the subject matters of claims 20-27 would not have been *prima facie* obvious in view of Quinlan, US 300.

Therefore, all objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Should any issues remain unresolved, the Examiner is encouraged to contact the undersigned attorney for Applicants at the telephone number indicated below in order to expeditiously resolve any remaining issues.

Respectfully submitted,

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Attachment: Declaration Under 37 C.F.R. §1.132 of Dr. Axon